REMARKS

Reconsideration of this Application is respectfully requested. Applicants thank the Examiner for the courtesy extended during the telephone conversation of March 5, 2004 and the Examiner's consideration of the cited art pursuant to the requirements of M.P.E.P. s 710.06.

Upon entry of the foregoing amendments, claims 32-76 are pending in the application, with claims 32 and 59 being the independent claims. Claims 77-88 have been canceled without prejudice or disclaimer. Support for the subject matter of the amended claims is contained in the application as originally filed. Because the foregoing changes introduce no new matter, their entry is respectfully requested.

Based on the above Amendment and the following Remarks, Applicants respectfully request that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

Objections to the Drawings

The Examiner made various objections to the drawings.

With regard to the objections concerning the linear actuators, Applicants respectfully submit that the accompanying amendment to the claims renders such objections moot. All references to linear actuators have been deleted from the claims.

With regard to the objections concerning FIG. 4, Applicants respectfully traverse the Examiner's objections. While FIG. 4 does not explicitly illustrate the structural connection between nozzles 65, FIG. 4 illustrates the spacial relationship between an array of nozzles (e.g., 65, 65) and a linkage arm 74 of a positioning mechanism 67. Applicants respectfully submit that such schematic representation of the spacial relationship, when considered in light of the detailed description of the operable connection between the array of nozzles and the positioning mechanism (*see* page 14, line 11, *et seq.*) is sufficient for one skilled in the art to understand the operable connection between the nozzles and the rotary actuator. Furthermore, Applicants

respectfully submit that it is not the specific structural connection that is being claimed, and thus, the specific structural connection need not be shown.

With respect to the plurality of dispensing nozzles divided into first and second sets of nozzles, FIG. 4 schematically illustrates sets of nozzles, each set configured to deliver liquid to a particular set of reaction vessels, namely, a particular column of wells 41 in mictrotiter plate 42. Cartridges 66, each of which including a set of nozzles, are illustrated in FIG. 1. The configuration of the sets of nozzles, examples of which is illustrated in FIGS. 1, 3, 4 and 14, are discussed on page 10, lines 18 *et seq.*, page 12, lines 7-34, the paragraph bridging pages 22 and 23, and page 23, lines 13 *et seq.* Applicants respectfully submit that sets of nozzles are shown in the drawings, as originally filed.

With liquid aspiration and in particular, an egress aperture extending radially outwardly from the axis of rotation, Applicants respectfully submit that such egress apertures are shown. *See*, e.g., FIGS. 12a, 12b and 13. While the apetures are oriented up-and-down in the figures, one would appreciate that the centrifugal forces represented by arrows CF and EL (FIGS. 11b, 11d, and 12b) represent forces developed while rotor 46 orbits well 41 about axis of rotation 51. Moreover, the specification specifically sets forth the structure and operation of claimed apparatus. Rotor 47 spins about axis of rotation 51. *See* FIG. 2; claim 32. Microtiter plate 42 is mounted on rotor 47 to spin about axis of rotation 51. *See* FIG. 2; claim 53. Wells 41, which are located in microtiter plate 42, similarly spin about the axis of rotation 51. *See* FIG. 2; claim 53. Thus, one would understand that arrows CF and EL are actually directed radially outward from the axis of rotation. Similarly, egress apertures 129, which extend parallel to arrows CF and EL, are also directed radially outward from the axis of rotation 51.

As for the valve and electric solenoid valves, Applicant notes that electric solenoid valves are shown FIG. 14 and discussed on page 26, lines 22 *et seq.* Furthermore, an electric solenoid valve which may be used in the reagent dispenser head is illustrated in FIGS. 7a and 7b. The actual construction of the valves are not illustrated, however, the actual construction of the valves is not claimed and thus does not require illustration.

Claim Objections

The Examiner made various objections to the Claims. Applicants respectfully submit that the accompanying amendment to the claims renders such objections moot.

Rejections under 35 U.S.C. § 112

The Examiner has rejected claims 40-43, 47-49, 54, 67, 68, 71-75, 82, 86 and 87 under 35 U.S.C. §112, first paragraph as failing to comply with the written description requirement. As noted above, claims 77-88 have been cancelled thus rendering the Examiner's rejection of claims 82, 86 and 87 moot.

Applicants respectfully traverse the Examiner's rejection of claims 40, 41, 67 and 68. The operation of a rotary actuator (e.g., circular arm 69 of positioning mechanism 67) is described in detail in the specification. For example, the operation of the rotary actuator is discussed on at least page 14, line 11, through page 16, line 19, and illustrated in FIG. 4.

Applicants respectfully traverse the Examiner's rejection of claims 42, 43, 71 and 72. The actuation of the nozzles and dispensing fluid while the rotor or dispensing head is moving along the circular path is described in detail in the specification as originally filed. For example, relevant discussion may be found on page 2, lines 28-32, page 3, lines 13-15, page 11, lines 26 *et seq.* ("reagent delivery dispenser 52 of the present invention is capable of addressing each well 41 individually while microtiter plate 42 is moving *while rotor assembly 46 is spinning*", *emphasis added*), page 13, lines 31 *et seq.* ("with out stopping dispenser head"), page 16, lines 4 *et seq.* ("because a continuous path system is established, the reagent dispenser head 60 may traverse over microtiter plate 42, *with both components in constant motion*" *emphasis added*), and a number of other occasions. The Examiner notes that the drawings are not sufficient to illustrate the functional limitations of these claims. Nonetheless, Applicants respectfully submit that FIG. 3 schematically illustrates nozzles of the reagent delivery head (e.g., dispenser head) *while the wells are in motion*, as indicated by arrow A.

Applicants respectfully traverse the Examiner's rejection of claims 47-49 and 73-75. The application, as originally filed, sets forth that the reagent dispenser 52 is a multi-channel dispenser that is capable of simultaneously delivering a plurality of different liquids to corresponding different sets of wells. *See* page 10, lines 18-19. One would appreciate that a multi-channel dispenser is one which has multiple sets of nozzles, each capable of delivering a respective liquid to a respective set of wells. Further, the application also describes that the multi-channel dispenser 52 is capable of sequentially delivering a plurality of different liquids to the wells. *See* page 10, lines 20-21. Furthermore, FIG. 3 schematically shows an exemplary two-channel delivery configuration having a first nozzle 65' filling one set of wells with a first reagent, and a second nozzle 65'' filing another set of wells with a second reagent. One would understand that FIG. 3 schematically illustrates nozzles 65' and 65'' simultaneously adding two different reagents R1 and R2. One would further understand, based on the written description noted above, and without necessitating further drawing figures, that the delivery may be sequential, for example, nozzle 65' first dispenses reagent R1, once reagent R1 has been dispensed, nozzle 65'' dispenses reagent R2. Thus sequential operation can be readily understood based on FIG. 3. Specifically, absence of R2 in FIG. 3 corresponds to a first step of dispensing R1 and absence of R1 corresponds to a second step of dispensing R2. Thus described, operation can be understood without unnecesary redundancy of figures.

Applicants respectfully traverse the Examiner's rejection of claim 54. The Examiner is correct in noting that the axis of rotation does not extend through each reaction vessel but extends through the center of the rotor. In fact, rotor 47 spins about axis of rotation 51. *See* FIG. 2; claim 32. Microtiter plate 42 is mounted on rotor 47 to spin about axis of rotation 51. *See* FIG. 2; claim 53. Wells 41, which are located in microtiter plate 42, similarly spin about the axis of rotation 51. *See* FIG. 2; claim 53. Thus, the spacial relationship of wells 42 and the axis of rotation 51 is defined. The application, as originally filed, describes that the rotor may be configured such that the orientation of the wells can vary with respect to the axis of rotation. For example, microtiter plate 42 may tilt during centrifugation. *See* FIG. 8b; page 18, lines 37 *et seq.* In the event that a substantially-vertical egress aperture (e.g., aperture 129) is provided on the bottom of a well of a tilting microtiter plate, such an aperture will extend to some degree radially

outward with respect to the axis of rotation. Furthermore, FIGS. 12a, 12b, and 13 disclose wells having egress apertures which extend parallel to the centrifugal forces exerted on the wells (e.g., arrow CF in FIG. 11b; arrow EL in FIG. 12b). One would appreciate that centrifugal forces generated by spinning the wells about axis of rotation 51 extend radially outward from the axis of rotation. Furthermore, the embodiment of FIGS. 10a to 10c disclose wells formed of a porous polymeric material. *See* page 20, lines 13 *et seq.* The porosity of the material does not support liquid under the higher forces of centrifugation. *See* page 20, lines 36-39. Thus, the pores of the material provide at least an egress aperture, if not many egress apertures, which extends in at least a one direction radially outward from the axis of rotation. Claim 54, as presently pending, is generic to the above mentioned embodiments, whereas claim 55 is specific to the porous material embodiment.

The Examiner has rejected claim 51 under 35 U.S.C. §112, second paragraph as failing to particularly point out and distinctly claim the invention. Applicants respectfully submit that the rejection of claim 51 is overcome by the accompanying amendment thereto.

Rejections under 35 U.S.C. § 102 and 103

Claims 32-58 and 59-76

The Examiner has rejected claims 32-58 and 59-76 under 35 U.S.C. § 102 and 103 as being anticipated by, or unpatentable over one or more of the following references: U.S. Patent No. 4,042,338 to Huber ("the Huber patent") and UK Specification No. 1,241,539 to American Hospital Supply Corporation ("the American specification"), U.S. Patent No. 6,423,536 to Jovanovich et al. ("the Jovanovich patent"), International Publication No. WO 99/25470 to Lebl ("the Lebl publication"), Japanese Publication No. 59-119268 to Sasao ("the Sasao publication"), the technical report by Lebl entitled "A New Approach to Automated Solid Phase Synthesis Based on Centrifugation of Tilted Plates" ("the Lebl report"), the webpage entitled "Spyder Technology: A New Approach to Automated Solid Phase Synthesis Based on Centrifugation of Tilited Plates" ("the Spyder webpage"), U.S. Patent No. 4,808,380 to Minekane ("the Minekane patent"), U.S. Patent No. 4,837,159 to Yamada ("the Yamada patent"), and U.S. Patent No. 5,472,672 to Brennan ("the Brennan patent").

The Huber patent, the American specification, the Jovanovich patent, the Lebl publication, the Sasao publication, the Lebl report, the Spyder webpage, the Minekane patent, the Yamada patent, and the Brennan patent, taken individually or combined, fail to teach or suggest the apparatus of the present invention including a rotor carrying an array of reaction vessels along a circular path about an axis of rotation in combination with a controller for moving a liquid dispenser head, which has a plurality of *valved* dispensing nozzles, *about the axis of rotation along the circular path*, and for selectively dipensing liquid itto two or more respective reaction vessels simultaneously, as is called for by independent claims 32 and 59, as presently amended.

In accordance with the present invention, reagent dispenser head 60 is mounted on a translation frame 62 which is configured to move dispenser head 60 with respect to the support surface 49. *See* page 11, lines 28 *et seq.* Dispenser head 60 is configured for moving along the circular path of microtiter plate 42, that is, along the fixed arcuate path of microtiter plate 42 as it spins with rotor assembly 46. *See* page 12, lines 1-5. Dispenser head 60 includes an array of valved dispensing nozzles 65 which may simultaneously address corresponding wells of microtiter plate 42. *See* page 12, lines 33-34. Since dispenser head 60 is configured to move along the circular path of microtiter plate 42, the array of valved dispensing nozzles 65 are similarly configured to move along the circular path.

The Huber patent does not disclose such features. Instead, in one embodiment the Huber patent discloses an automatic sample preparation device having a delivery pump assembly 24, which includes a support frame 26 for reciprocal horizontal movement on support bars 28, as indicated by arrow 30. *See* column 3, lines 47-54; FIG. 1. In another embodiment, delivery pump assembly 24 includes a support member 50 for vertical movement. *See* column 5, lines 28-46; FIG. 2. In still another embodiment, delivery assembly 24 rotates sampling probes 62 about an axis of the support member 64 so that in one position they dip into a sample contained in a sample storage vessel 68, and in another position they dip into the sample containers 12. In yet another embodiment, delivery assembly 24 includes a drive device 52 for vertically moving the sampling probes 48. *See* column 6, lines 57-60; FIG. 4.

The Huber patent fails to teach or suggest moving a liquid dispenser head about the axis of rotation along the circular path, much less a liquid dispenser head having valved nozzles moving along the circular path as is called for by claim 32. Instead, the Huber patent teaches away from the present invention in that Huber's dispensing probes 48 move substantially perpendicular to the circular path. In particular, the pump assembly of FIG. 1 moves substantially radially with respect to drive shaft 14. The pump assemblies of FIGS. 2 and 4 move substantially parallel with respect to drive shaft 14. And the pump assembly of FIG. 3 pivots dispensing probes 48 about an axis (i.e., the longitudinal axis of support member 64) that is substantially perpendicular to drive shaft 14. None of the embodiments teach or suggest moving about the axis of rotation along the circular path.

Nor does the American specification disclose such features. Instead, the American specification discloses a cell-washing centrifuge having a tube 15 which delivers liquid from a reagent supply 13, via reagent flow control 16, into an annular manifold chamber 46. Although the annular manifold chamber 46 and its nozzles 48 moves with head 13 and drive shaft 19, the chamber/nozzle assembly is not a dispenser[1], it is a manifold[2]. In fact, the American specification teaches away from the present invention in that manifold chamber 46 is a passive conduit or passageway that does not include valves and is thus is incapable of selectively metering out liquid, much less metering out different liquids into different sets of test tubes. Instead, a valve (i.e., reagent flow control 16) is provided to control liquid flow, which flow control is located in casing 11 outside of well 18 and thus cannot rotate with either head 13 or drive shaft 19. *See* FIG. 3. Thus, the American specification fails to teach or suggest a liquid dispenser head having valved nozzles which moves along a circular path.

With respect to the Examiner's characterization of American's manifold chamber 46 as a "multi-channel" dispenser, Applicants note that manifold chamber 46 is indiscriminate in its

[1] Dispense: to deal out in portions. *See* MERRIAM-WEBSTER ONLINE (www.Merriam-Webster.com), 2004, Merriam-Webster, Incorporated. Springfield, MA (printout attached).
[2] Manifold: a pipe fitting with several lateral outlets for connecting one pipe with others; a fitting on an internal combustion engine that directs a fuel and air mixture to or receives the exhaust gases from several cylinders. *See* MERRIAM-WEBSTER ONLINE (www.Merriam-Webster.com), 2004, Merriam-Webster, Incorporated. Springfield, MA (printout attached).

delivery of liquid from tube 15 to test tubes 26. The manifold chamber is simply incapable of delivering directing a first reagent to a first set of test tubes and a second reagent to a second set of test tubes. Any reagent delivered to manifold chamber 46 will be delivered to all test tubes 26, most likely in substantially equal portions to each of the test tubes. Thus, manifold chamber 46 is a single-channel device, which is consistent with American's use of the term "manifold".

With respect to the Examiner's position that the American specification discloses a controller "actuates" nozzles 48 of manifold chamber 46, Applicants note that nozzles 48 are merely passageways directing liquid flow from the manifold chamber 46 into test tubes 26. The nozzles have no valves or moving parts and thus have nothing to actuate. Instead, timing and synchronizing means 36 actuates "a suitable valve 16" that delivers liquid through tube 15 into manifold chamber 46 and, in turn, through nozzles 48 into test tubes 26. *See* page 2, lines 29-37; FIG. 3. It is valve 16 that is actuated, not the nozzles.

Similarly, the Jovanovich patent teaches away from the present invention. The Jovanovich patent discloses a biochemical reaction system utilizing a capillary cassette 15 to deliver liquid from a dispensing device location 122 to a multiwell plate 36. *See* e.g., FIGS. 1 and 5B; column 10, lines 24 *et seq*. Jovanovich's dispensing device does not move along the [illegible] along a cirucular path of rotor 41. *See* FIGS. 5A and 5B; column 10, lines 53 *et seq*. Like American's manifold, capillary cassette 15 is a passive conduit or passageway that is incapable of metering out fluid. In particular, capillary cassette 15 temporarily holds liquid, which has already been dispensed at the dispensing device location 122. *See id.* Capillary cassette 15 is not a dispenser but is instead a [illegible] of the Jovanovich's system that is at the